

**PCT****NOTIFICATION OF ELECTION**

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents  
United States Patent and Trademark  
Office  
Box PCT  
Washington, D.C.20231  
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 15 June 2000 (15.06.00)	
International application No. PCT/NZ99/00177	Applicant's or agent's file reference NZ9900165VG
International filing date (day/month/year) 26 October 1999 (26.10.99)	Priority date (day/month/year) 23 October 1998 (23.10.98)
Applicant COOK, Christian, John	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:  
15 May 2000 (15.05.00)

☐ in a notice effecting later election filed with the International Bureau on:  
\_\_\_\_\_

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

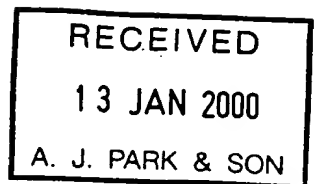
Facsimile No.: (41-22) 740.14.35

Authorized officer

C. Cupello

Telephone No.: (41-22) 338.83.38

ENT COOPERATION TREATY  
PCT  
INTERNATIONAL SEARCH REPORT



(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference P412504 TVG	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/NZ 99/00177	International filing date (day/month/year) 26 October 1999	(Earliest) Priority Date (day/month/year) 23 October 1998
Applicant THE HORTICULTURE AND FOOD RESEARCH INSTITUTE OF NEW ZEALAND LTD et al		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 5 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item. \*

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☒ Unity of invention is lacking (See Box II).

4. With regard to the title, ☐ the text is approved as submitted by the applicant.  
☒ the text has been established by this Authority to read as follows:

**DETERMINING MEAT QUALITY OF A LIVE ANIMAL**

5. With regard to the abstract, ☒ the text is approved as submitted by the applicant  
☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No. 1

☒ as suggested by the applicant.

☐ None of the figures

☐ because the applicant failed to suggest a figure

☐ because this figure better characterizes the invention

**Box 1** Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

**Box II** Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. Claims 1-91 directed to a method and apparatus for determining meat quality of an animal.
  2. Claims 92-98 directed to a temperature sensing device
- 
1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
  2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/NZ 99/00177

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>																						
Int Cl <sup>6</sup> : G01N 33/12, 25/00, G01K 13/00, 1/14, 1/20																						
According to International Patent Classification (IPC) or to both national classification and IPC																						
<b>B. FIELDS SEARCHED</b>																						
Minimum documentation searched (classification system followed by classification symbols) IPC: G01N, G01K, A01K																						
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched																						
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) DWPI: (HEAT OR TEMPERATURE) AND (STRESS+ OR PH OR TENDER+)																						
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>																						
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.																				
X	GB 2251683 A (AOYAMA) 15 July 1992 See whole document	20-33, 35-37, 57, 58, 60, 61, 63-69, 71, 74- 80, 82, 85-91																				
X	DE 4025404 A (FENDT et al) 13 February 1992 See whole document	20-33, 35-37, 57, 58, 60, 63-69, 71, 74-80, 82, 85-91																				
A	WO 95/01567 A (THE MINISTER OF AGRICULTURE) 12 January 1995 See whole document	1-91																				
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex																						
<p>* Special categories of cited documents:</p> <table border="0"> <tr> <td>"A"</td> <td>document defining the general state of the art which is not considered to be of particular relevance</td> <td>"T"</td> <td>later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>"E"</td> <td>earlier application or patent but published on or after the international filing date</td> <td>"X"</td> <td>document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>"L"</td> <td>document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>"Y"</td> <td>document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td>"O"</td> <td>document referring to an oral disclosure, use, exhibition or other means</td> <td>"&amp;"</td> <td>document member of the same patent family</td> </tr> <tr> <td>"P"</td> <td>document published prior to the international filing date but later than the priority date claimed</td> <td></td> <td></td> </tr> </table>			"A"	document defining the general state of the art which is not considered to be of particular relevance	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	"E"	earlier application or patent but published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	"O"	document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family	"P"	document published prior to the international filing date but later than the priority date claimed		
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"E"	earlier application or patent but published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone																			
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art																			
"O"	document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family																			
"P"	document published prior to the international filing date but later than the priority date claimed																					
Date of the actual completion of the international search 30 December 1999		Date of mailing of the international search report 06 JAN 2000																				
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929		Authorized officer  <b>GREG POWELL</b> Telephone No.: (02) 6283 2308																				

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/NZ 99/00177

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2145224 A (DENNIS) 20 March 1985 Whole document	92-98
X	EP 166069 A (FRANTSITS) 2 January 1986 Whole document	92-98
X	DE 3610960 A (OBERSCHMID et al) 8 October 1987 Figures	92-98

### Information on patent family members

**PCT/NZ 99/00177**

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
GB	2251683	AU	89884/91	JP	6090969	US	5285396
WO	95/01567	AU	72248/94	CN	1129983	EP	706654
		NZ	268868	US	5458418	US	5595444
END OF ANNEX							

**PATENT COOPERATION TREATY**  
**PCT**  
**INTERNATIONAL PRELIMINARY EXAMINATION REPORT**  
(PCT Article 36 and Rule 70)

REC'D 13 FEB 2001

WIPO PCT

Applicant's or agent's file reference <b>P412504 TJH</b>	<b>FOR FURTHER ACTION</b>	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International Application No. <b>PCT/NZ99/00177</b>	International Filing Date (day/month/year) <b>26 October 1999</b>	Priority Date (day/month/year) <b>23 October 1998</b>
International Patent Classification (IPC) or national classification and IPC <b>Int. Cl. <sup>7</sup> G01N 33/12, 25/00, G01K 13/00, 1/14, 1/20</b>		
Applicant <b>THE HORTICULTURE AND FOOD RESEARCH INSTITUTE OF NEW ZEALAND LIMITED et al</b>		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of **6** sheets, including this cover sheet.  
☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of  sheet(s).

3. This report contains indications relating to the following items:

- |      |                                     |   |
|------|-------------------------------------|---|
| I    | <input checked="" type="checkbox"/> | Basis of the report   |
| II   | <input type="checkbox"/>            | Priority  |
| III  | <input type="checkbox"/>            | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability  |
| IV   | <input checked="" type="checkbox"/> | Lack of unity of invention  |
| V    | <input checked="" type="checkbox"/> | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| VI   | <input type="checkbox"/>            | Certain documents cited   |
| VII  | <input type="checkbox"/>            | Certain defects in the international application  |
| VIII | <input checked="" type="checkbox"/> | Certain observations on the international application   |

Date of submission of the demand <b>15 May 2000</b>	Date of completion of the report <b>5 January 2001</b>
Name and mailing address of the IPEA/AU <b>AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929</b>	Authorized Officer  <b>GREG POWELL</b> Telephone No. (02) 6283 2308

**I. Basis of the report****1. With regard to the elements of the international application:\***

- ☒ the international application as originally filed.
- ☐ the description,        pages , as originally filed,  
   pages , filed with the demand,  
   pages , received on    with the letter of
- ☐ the claims,                pages , as originally filed,  
   pages , as amended (together with any statement) under Article 19,  
   pages , filed with the demand,  
   pages , received on    with the letter of
- ☐ the drawings,            pages , as originally filed,  
   pages , filed with the demand,  
   pages , received on    with the letter of
- ☐ the sequence listing part of the description:  
   pages , as originally filed  
   pages , filed with the demand  
   pages , received on    with the letter of

**2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.**

These elements were available or furnished to this Authority in the following language which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

**3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, was on the basis of the sequence listing:**

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

**4. ☐ The amendments have resulted in the cancellation of:**

- ☐ the description,        pages
- ☐ the claims,            Nos.
- ☐ the drawings,        sheets/fig.

**5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\***

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

**IV. Lack of unity of invention**

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
- ☐ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☒ not complied with for the following reasons:

The International Preliminary Examining Authority has found that there are two inventions. They are:

- (1) Claims 1-91 directed to a method and apparatus for determining meat quality of an animal
- (2) Claims 92-98 directed to a temperature sensing device.

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.
- ☐ the parts relating to claims Nos.

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Claims 1-19,24,25,34,37-56,59,62,64,70,72,73,81,83,84,93-96	YES
	Claims 20-23,26-33,35,36,57,58,60,61,63,65-69,71,74-80,82,85-92,97,98	NO
Inventive step (IS)	Claims 1-19,34,38-56,59,62,70,72,73,81,83,84	YES
	Claims 20-33,35-37,57,58,60,61,63-69,71,74-80,82,85-98	NO
Industrial applicability (IA)	Claims 1-98	YES
	Claims	NO

**2. Citations and explanations (Rule 70.7)**

The following documents identified in the International Search Report have been considered for the purposes of this report:

- (a) GB 2251683
- (b) DE 4025404
- (c) GB 2145224
- (d) EP 166069
- (e) DE 3610960

**NOVELTY (N)**

**Claims 20, 21, 57, 68, 79, 89**

Each one of documents (a) and (b) disclose the features of these claims. With regard to claims 57 and 79, while the systems of documents (a) and (b) are not used for determining meat quality or pH, they are, nevertheless, suitable for such purposes. This is all these claims define.

**Claims 23, 28-35, 58, 60, 65-67, 69, 71, 75-78, 80, 82, 87, 88, 90, 91**

The features defined in these claims are clearly found in each one of documents (a) and (b). They are clearly not novel.

**Claims 22, 26, 27, 61**

Document (a) discloses the features defined in these claims. They are anticipated.

**Claims 36, 63, 74, 85**

Document (b) discloses the features of these claims. They do not add anything novel.

(continued)

**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

**Continuation of Box V**Claims 92, 97, 98

Each one of documents (c)-(e) discloses a temperature sensing device having all the features found in these claims. They are clearly not novel.

INVENTIVE STEP (IS)

Claims 20-23, 26-33, 35, 36, 57, 58, 60, 61, 63, 65-69, 71, 74-80, 82, 85-92, 97 and 98 also lack an inventive step for the reasons given above.

Claims 24, 25, 37, 64, 86

The features found in these claims add nothing inventive over the disclosures of either one of documents (a) or (b). For example, the amount of time over which temperature measurements are to be made is a mere choice to be made by the person skilled in the art depending on the circumstances.

Claims 93-96

The features added by these claims add nothing inventive over the disclosures of any one of documents (c)-(e). For example, adjusting temperature measurements to take into account ambient temperature variations is common general knowledge in the art.

Claims 1-19, 34, 38-56, 59, 62, 70, 72, 73, 81, 83, 84

Claims 1-19, 34, 38-56, 59, 62, 70, 72, 73, 81, 83, and 84 meet the criteria set forth in PCT Article 33(2)-(4) for novelty, inventive step and industrial applicability. The prior art published before the priority date does not disclose methods of measuring the pH levels or body temperature of an animal and then using these measurements to provide an indication of the stress level of an animal or the meat quality in an animal. There is also no disclosure of the algorithm used to calculate these measurements.

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 38 is not clear because it does not limit the "method" to being one defined in previous claims. The phrase "using a method of the invention" is not sufficient. Which method is being used?

# INTERNATIONAL COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 27 FEB 2001

WIPO

PCT

14

Applicant's or agent's file reference <b>P412504 TJH</b>	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).	
International Application No. <b>PCT/NZ99/00177</b>	International Filing Date (day/month/year) <b>26 October 1999</b>	Priority Date (day/month/year) <b>23 October 1998</b>
International Patent Classification (IPC) or national classification and IPC <b>Int. Cl. <sup>7</sup> G01N 33/12, 25/00, G01K 13/00, 1/14, 1/20</b>		
Applicant <b>THE HORTICULTURE AND FOOD RESEARCH INSTITUTE OF NEW ZEALAND LIMITED et al</b>		

1.	This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.																
2.	This REPORT consists of a total of <b>5</b> sheets, including this cover sheet.  <input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).  These annexes consist of a total of <b>9</b> sheet(s).																
3.	This report contains indications relating to the following items:  <table border="0"> <tr> <td>I</td> <td><input checked="" type="checkbox"/> Basis of the report</td> </tr> <tr> <td>II</td> <td><input type="checkbox"/> Priority</td> </tr> <tr> <td>III</td> <td><input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td>IV</td> <td><input checked="" type="checkbox"/> Lack of unity of invention</td> </tr> <tr> <td>V</td> <td><input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td>VI</td> <td><input type="checkbox"/> Certain documents cited</td> </tr> <tr> <td>VII</td> <td><input type="checkbox"/> Certain defects in the international application</td> </tr> <tr> <td>VIII</td> <td><input type="checkbox"/> Certain observations on the international application</td> </tr> </table>	I	<input checked="" type="checkbox"/> Basis of the report	II	<input type="checkbox"/> Priority	III	<input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	IV	<input checked="" type="checkbox"/> Lack of unity of invention	V	<input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	VI	<input type="checkbox"/> Certain documents cited	VII	<input type="checkbox"/> Certain defects in the international application	VIII	<input type="checkbox"/> Certain observations on the international application
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VII	<input type="checkbox"/> Certain defects in the international application																
VIII	<input type="checkbox"/> Certain observations on the international application																

**CORRECTED  
VERSION**

Date of submission of the demand <b>15 May 2000</b>	Date of completion of the report <b>19 February 2001</b>
Name and mailing address of the IPEA/AU <b>AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929</b>	Authorized Officer  <b>GREG POWELL</b> Telephone No. (02) 6283 2308

**I. Basis of the report****1. With regard to the elements of the international application:\***

- ☐ the international application as originally filed.
- ☒ the description, pages 1-8, 13-32, as originally filed,  
pages , filed with the demand,  
pages 9-12, received on 23 October 2000 with the letter of 20 October 2000
- ☒ the claims, pages 33-38, 40-42, 44, 46, 48, 49, as originally filed,  
pages , as amended (together with any statement) under Article 19,  
pages , filed with the demand,  
pages 39, 43, 45, 47, 50, received on 23 October 2000 with the letter of 20 October 2000
- ☒ the drawings, pages 1/5-5/5, as originally filed,  
pages , filed with the demand,  
pages , received on with the letter of
- ☐ the sequence listing part of the description:  
pages , as originally filed  
pages , filed with the demand  
pages , received on with the letter of

**2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.**

These elements were available or furnished to this Authority in the following language which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

**3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, was on the basis of the sequence listing:**

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

**4. The amendments have resulted in the cancellation of:**

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/fig.

**5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\***

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

**IV. Lack of unity of invention**

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
- ☐ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☒ not complied with for the following reasons:

The International Preliminary Examining Authority has found that there are two inventions. They are:

- (1) Claims 1-88 directed to a method and apparatus for determining meat quality of an animal
- (2) Claims 89-94 directed to a temperature sensing device.

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.
- ☐ the parts relating to claims Nos.

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims	1-19,22,24-27,34,37-56,59,61,62,64,70,72,73,81,83,84,86,89-94	<b>YES</b>
	Claims	20,21,23,28-33,35,36,57,58,60,63,65-69,71,74-80,82,85,87,88	<b>NO</b>
Inventive step (IS)	Claims	1-19,34,38-56,59,62,70,72,73,81,83,84	<b>YES</b>
	Claims	20-33,35-37,57,58,60,61,63-69,71,74-80,82,85-94	<b>NO</b>
Industrial applicability (IA)	Claims	1-98	<b>YES</b>
	Claims		<b>NO</b>

**2. Citations and explanations (Rule 70.7)**

The following documents identified in the International Search Report have been considered for the purposes of this report:

- (a) DE 4025404
- (b) GB 2251683
- (c) GB 2145224
- (d) EP 166069
- (e) DE 3610960

**NOVELTY (N)****Claims 20, 21, 57, 68, 79**

Document (a) discloses the features of these claims. There is clear reference in this document to using an average value in determining the condition of the animal. Averages result when a cumulative count is used in some way. With regard to claims 57 and 79, while the systems of document (a) is not used for determining meat quality or pH, it is, nevertheless, suitable for such purposes, which is all the claims require. Also, while there is no explicit mention of a sampling time of 3-36 hours, it is clearly implicit in document (a).

**Claims 23, 28-33, 35, 36, 58, 60, 63, 65-67, 69, 71, 74-78, 80, 82, 85, 87, 88**

The features defined in these claims are clearly found in document (a). They are clearly not novel. —

**INVENTIVE STEP (IS)**

Claims 20, 21, 23, 28-33, 35, 36, 57, 58, 60, 63, 65-69, 71, 74-80, 82, 85 and 88 also lack an inventive step for the reasons given above.

**Claims 22, 26, 27, 61**

Document (b) discloses the features defined in these claims. The combination of document (a) with (b), as would be obvious to a person skilled in the art, anticipates these claims.

(continued)

**Supplemental B x**

(To be used when the space in any of the preceding boxes is not sufficient)

**Continuation of Box V**Claims 24, 25, 37, 64, 86

The features found in these claims add nothing inventive over the disclosure of document (a). For example, the amount of time over which temperature measurements are to be made is a mere choice to be made by the person skilled in the art depending on the circumstances.

Claims 89, 94

Each one of documents (c)-(e) discloses a temperature sensing device having all the features found in this claim, with the exception of having the tag extend through an animal body part. Rather the documents disclose temperature sensors which extend into or across a body part. This is clearly just a mere workshop variation to be made by the person skilled in the art depending on the circumstances. The claim defines no inventive step.

Claims 90-93

The features added by these claims add nothing inventive over the disclosures of any one of documents (c)-(e). For example, adjusting temperature measurements to take into account ambient temperature variations is common general knowledge in the art.

Claims 1-19, 34, 38-56, 59, 62, 70, 72, 73, 81, 83, 84

Claims 1-19, 34, 38-56, 59, 62, 70, 72, 73, 81, 83, and 84 meet the criteria set forth in PCT Article 33(2)-(4) for novelty, inventive step and industrial applicability. The prior art published before the priority date does not disclose methods of measuring the pH levels or body temperature of an animal and then using these measurements to provide an indication of the stress level of an animal or the meat quality in an animal. There is also no disclosure of the algorithm used to calculate these measurements.

- 9 -

In accordance with another aspect of the present invention, there is provided a system for providing an indication of meat quality in an animal to be slaughtered, the system including:

- 5 a body mountable measurement device for obtaining measurements corresponding to the body temperature of the animal at periodic time intervals over a period of 3-36 hours;
- a processor having an input means to receive the measurements from the measurement device, the processor operable to implement an algorithm to the
- 10 measurements, which algorithm cumulatively takes account of variations in body temperature over time, wherein the processor has an output means for the result of the algorithm.

The system may be implemented in an all-in-one indicator device. Such a device may be mounted on the animal eg ear tag, tail tag or provided on a collar. The tag may also incorporate the measurement device. In an alternative form of the invention, the measurement device may be remote from the tag. The measurements may be sent to the processor by way of a transmitter or by a cable. In one preferred form of the invention, the measurement device may be provided by way of a thermistor to be deposited in the inner ear canal of the animal with a cable connected to an ear tag which houses the processor.

20 In yet another embodiment of the present invention, the processor may be provided by way of a remote computer. In this embodiment, a device for mounting on the animal will suitably incorporate transmitters to send the measurements to the remote computer. The remote computer may be a field device which is able to sense and account for ambient temperatures and solar radiation. Alternatively, a separate field device may be provided to send information relating to ambient temperature and solar radiation to a remote processor. The remote computer also receives the measurements from the measurement device provided on the animal either directly or via the field device.

30 The output from the processor may be in any of various forms. A simple numeric value may be output for the attendant to decide whether or not it falls within acceptable limits.

- 10 -

The value might be compared to a meat tenderness scale for quantitative assessment as to whether it falls within acceptable limits. However, in most embodiments it is preferred that the processor is operable to compare the outputs of the algorithm to a predetermined threshold. The system may also include an indicator to indicate where the output of the algorithm has exceeded the predetermined threshold. Any of the features described in connection with the above-described method of indicating meat quality may be implemented in the system.

In accordance with yet another aspect of the present invention, there is provided a system for indicating cumulative stress in an animal, the system including:

a body mountable measurement device for obtaining measurements corresponding to outer body temperature of the animal at periodic time intervals over a period of 3-36 hours;  
a processor having an input to receive measurements from the measurement device, the processor operable to implement an algorithm to the measurements, which algorithm cumulatively takes account of variations in body temperature over time, wherein the processor has an output for the result of the algorithm.

The system for providing an indication of stress may be implemented in any of the various forms discussed above for the system providing an indication of meat quality. Such a system for indicating cumulative stress might have particular application to animals where the effects of stress might be dangerous either to the animal itself, to other animals or in particular to humans. For example, horses might be more prone to erratic behaviour and a danger to their riders if they are subjected to sustained periods of stress. A system implemented in the form of an all-in-one indicator device may provide simple indication to the rider that the animal is stressed and needing rest or food.

Preferably, the processor is also operable to compare the output of the processor with a predetermined threshold. The system preferably incorporates an indicator to provide indication that the predetermined threshold has been exceeded. In an all-in-one indicator device, this may be implemented by a simple visual indicator such as a flashing led. In an

- 11 -

embodiment with a remote computer then the output of the computer may provide the identification numbers of those animals which have exceeded the threshold.

In accordance with a still further aspect of the invention, there is provided a system of  
5 providing an indication of ultimate meat pH of an animal, the system including:

a body mountable measurement device for obtaining measurements corresponding to  
outer body temperature of the animal at periodic time intervals over a period of 3-36 hours;

a processor having an input to receive measurements from the measurement device, the  
processor operable to implement an algorithm to the measurements, which algorithm  
10 cumulatively takes account of variations in body temperature over time, wherein the  
processor has an output for the result of the algorithm.

In a further aspect, the present invention provides:

- 12 -

A temperature sensing device including:

5 a tag having an attachment portion to extend through a body part of an animal, the tag incorporating an indicator means; and  
one or more animal temperature sensors disposed on/in the attachment portion for contact with the animal during use.

10 Preferably, the tag is an ear tag. Preferably, an ambient temperature sensor is also provided on the tag. Further, the tag may be provided with comparison means to compare the ambient temperature with the animal temperature. An indicator may also be disposed on the tag, the indicator being responsive to the comparison means.

15 Desirably, the tag comprises a one piece moulded body.

Also contemplated by the present invention is the use of the temperature sensing device in the methods of the invention as described above.

20 This invention may also be said broadly to consist in the parts, elements and features referred to or indicated in the specification of the application, individually or collectively, and any or all combinations of any two or more of said parts, elements or features, and where specific integers are mentioned herein which have known equivalents in the art to which this invention relates, such known equivalents are deemed to be incorporated herein as if individually set forth.

25 The invention consists in the foregoing and also envisages constructions of which the following give examples.

- 39 -

where initially:

$$n=1$$

$$d_0=t_{ear}-t_{ambient}$$

$$fast_0=d_0$$

5  $slow_0=d_0$

$$v_0=0$$

and where at each sampling interval:

$$d_n = t_{ear} - t_{ambient}$$

10

$$fast_n = (1-c_1)*fast_{n-1} + c_1*d_n$$

$$slow_n = (1-c_2)*slow_{n-1} + c_2*d_n$$

then:  $v_n = v_{n-1} + (fast_n - slow_n)$ .

15

35. The method as claimed in any one of claims 20 to 34 wherein the measurements are taken on the outer part of the animal's body.

20 36. The method as claimed in claim 35 wherein skin temperature measurements are taken and compensation is provided for ambient temperature and/or solar radiation.

37. The method as claimed in claim 35 wherein measurements are taken in the ear canal of the animal.

25

38. A method of measuring stress levels in an animal, the method comprising measuring the animal's pH level using a method of any one of claims 1 to 19, a pH level greater than 5.8 to 6.2 indicating a stressed animal.

54. The method as claimed in any one of claims 39 to 53 wherein the measurements are taken on the outer part of the animal's body.

5 55. The method as claimed in claim 54 wherein skin temperature measurements are taken and compensation is provided for ambient temperature and/or solar radiation.

56. The method as claimed in claim 54 wherein measurements are taken in the ear canal of the animal.

10

57. A system for providing an indication of meat quality in an animal to be slaughtered, the system including:

a body mountable measurement device for obtaining measurements corresponding to the body temperature of the animal at periodic sampling intervals over a period of between 3-36 hours;

15

a processor having an input means to receive the measurements from the measurement device, the processor operable to implement an algorithm to the measurements, which algorithm cumulatively takes account of variations in body temperature over time, wherein the processor has an output means for the result of the algorithm.

20

58. The system as claimed in claim 57 wherein the algorithm is as follows:  
determine the animal's mean body temperature from the measurements;  
calculate the variance between each measurement and the mean; and  
add all variances to obtain a cumulative variance score.

25

59. The system as claimed in claim 57 wherein the algorithm is as follows:  
where:

$t_{ear}$  is the instantaneous ear temperature;

$t_{ambient}$  is the instantaneous ambient air temperature;

30

- 45 -

62. The system as claimed in claim 61 wherein the tag incorporates the measurement device.
- 5 63. The system as claimed in any one of claims 57 to 59, wherein the processor is provided by way of a remote computer.
64. The system as claimed in any one of claims 57 to 63 wherein the processor is adapted to output a numeric value from a comparison with a meat tenderness scale.
- 10 65. The system as claimed in any one of claims 57 to 63 wherein the processor is operable to compare the output of the algorithm to a predetermined threshold.
- 15 66. The system as claimed in claim 65 further including an indicator to indicate where the output of the algorithm has exceeded the predetermined threshold.
- 20 67. The system as claimed in claim 66 wherein the indicator is also operable to provide an indication that the system is functioning.
- 25 68. A system for indicating cumulative stress in an animal, the system including:  
a body mountable measurement device for obtaining measurements corresponding to outer body temperature of the animal at periodic time intervals over a period of between 3-6 hours;  
a processor having an input to receive measurements from the measurement device, the processor operable to implement an algorithm to the measurements, which algorithm cumulatively takes account of variations in body temperature over time, wherein the processor has an output for the result of the algorithm.
- 30 69. The system as claimed in claim 68 wherein the algorithm is as follows:  
determine the animal's average body temperature from the measurements;  
calculate the variance between each measurement and the average; and

- 47 -

then:  $v_n = v_{n-1} + (fast_n - slow_n)$ .

71. The system as claimed in any one of claims 68 to 70 wherein the system is embodied in an all-in-one indicator device.

72. The system as claimed in claim 71 wherein the device is provided in the form of an ear tag.

73. The system as claimed in claim 72 wherein the tag incorporates the measurement device.

74. The system as claimed in any one of claims 68 to 70 wherein the processor is provided by way of a remote computer.

75. The system as claimed in any one of claims 68 to 74 wherein the processor is adapted to output a numeric value or comparison with a meat tenderness scale.

76. The system as claimed in any one of claims 68 to 74 wherein the processor is operable to compare the output of the algorithm to a predetermined threshold.

77. The system as claimed in claim 76 further including an indicator to indicate where the output of the algorithm has exceeded the predetermined threshold.

78. The system as claimed in claim 77 wherein the indicator is operable to indicate that the system is functioning.

79. A system of indicating pH in an animal, the system including:  
a body mountable measurement device for obtaining measurements corresponding to outer body temperature of the animal at periodic time intervals over a period of between 3-6 hours;  
a processor having an input to receive measurements from the measurement

- 50 -

88. The system as claimed in claim 87 further including an indicator to indicate where the output of the algorithm has exceeded the predetermined threshold.

5 89. A temperature sensing device including:  
a tag having an attachment portion to extend through a body part of an animal, the tag incorporating an indicator means; and  
one or more animal temperature sensors disposed on/in the attachment portion for contact with the animal during use.

10

90 The tag as claimed in claim 89 wherein the tag is an ear tag.

91. The tag as claimed in claim 89 or claim 90 wherein, an ambient temperature sensor is also provided on the tag.

15

92. The tag as claimed in any one of claims 89 to 91 wherein a comparison means is provided to compare the ambient temperature with the animal temperature.

20

93. The tag as claimed in claim 92 wherein an indicator is disposed on the tag, the indicator being responsive to the comparison means.

94. The tag as claimed in any one of claims 89 to 93 wherein the tag comprises a one piece moulded body.

25

In accordance with another aspect of the present invention, there is provided a system for providing an indication of meat quality in an animal to be slaughtered, the system including:

- 5 a measurement device for obtaining measurements corresponding to the body temperature of the animal at periodic time intervals;
- a processor having an input means to receive the measurements from the measurement device, the processor operable to implement an algorithm to the
- 10 measurements, which algorithm cumulatively takes account of variations in body temperature over time, wherein the processor has an output means for the result of the algorithm.

The system may be implemented in an all-in-one indicator device. Such a device may be mounted on the animal eg ear tag, tail tag or provided on a collar. The tag may also incorporate the measurement device. In an alternative form of the invention, the

15 measurement device may be remote from the tag. The measurements may be sent to the processor by way of a transmitter or by a cable. In one preferred form of the invention, the measurement device may be provided by way of a thermistor to be deposited in the inner ear canal of the animal with a cable connected to an ear tag which houses the processor.

20 In yet another embodiment of the present invention, the processor may be provided by way of a remote computer. In this embodiment, a device for mounting on the animal will suitably incorporate transmitters to send the measurements to the remote computer. The remote computer may be a field device which is able to sense and account for ambient temperatures and solar radiation. Alternatively, a separate field device may be provided

25 to send information relating to ambient temperature and solar radiation to a remote processor. The remote computer also receives the measurements from the measurement device provided on the animal either directly or via the field device.

The output from the processor may be in any of various forms. A simple numeric value

30 may be output for the attendant to decide whether or not it falls within acceptable limits.

The value might be compared to a meat tenderness scale for quantitative assessment as to whether it falls within acceptable limits. However, in most embodiments it is preferred that the processor is operable to compare the outputs of the algorithm to a predetermined threshold. The system may also include an indicator to indicate where the output of the algorithm has exceeded the predetermined threshold. Any of the features described in connection with the above-described method of indicating meat quality may be implemented in the system.

In accordance with yet another aspect of the present invention, there is provided a system for indicating cumulative stress in an animal, the system including:

a measurement device for obtaining measurements corresponding to outer body temperature of the animal at periodic time intervals;

a processor having an input to receive measurements from the measurement device, the processor operable to implement an algorithm to the measurements, which algorithm cumulatively takes account of variations in body temperature over time, wherein the processor has an output for the result of the algorithm.

The system for providing an indication of stress may be implemented in any of the various forms discussed above for the system providing an indication of meat quality. Such a system for indicating cumulative stress might have particular application to animals where the effects of stress might be dangerous either to the animal itself, to other animals or in particular to humans. For example, horses might be more prone to erratic behaviour and a danger to their riders if they are subjected to sustained periods of stress. A system implemented in the form of an all-in-one indicator device may provide simple indication to the rider that the animal is stressed and needing rest or food.

Preferably, the processor is also operable to compare the output of the processor with a predetermined threshold. The system preferably incorporates an indicator to provide indication that the predetermined threshold has been exceeded. In an all-in-one indicator device, this may be implemented by a simple visual indicator such as a flashing led. In an

embodiment with a remote computer then the output of the computer may provide the identification numbers of those animals which have exceeded the threshold.

In accordance with a still further aspect of the invention, there is provided a system of providing an indication of ultimate meat pH of an animal, the system including:

a measurement device for obtaining measurements corresponding to outer body temperature of the animal at periodic time intervals;

a processor having an input to receive measurements from the measurement device, the processor operable to implement an algorithm to the measurements, which algorithm cumulatively takes account of variations in body temperature over time, wherein the processor has an output for the result of the algorithm.

In accordance with yet a further aspect of the present invention, there is provided a computer program for providing an indication of meat quality in an animal to be slaughtered or for providing an indication of cumulative stress in an animal or for providing an indication of pH, the computer program including:

input means for receiving measurements corresponding to the body temperature of the animal at periodic time intervals;

an analysis engine programmed to implement an algorithm to the measurements, which algorithm cumulatively takes account of variations in body temperature over time and output means for the result of the algorithm.

Preferably, the analysis engine is also programmed to compare the result of the algorithm to a predetermined threshold.

Preferably, the computer program is embodied in a microprocessor.

In a further aspect, the present invention provides:

A temperature sensing device including:

5 a tag having an attachment portion for attachment of the tag to an animal, the tag incorporating an indicator means; and one or more animal temperature sensors disposed on/in the tag for contact with the animal during use.

10 Preferably, the tag is an ear tag. Preferably, an ambient temperature sensor is also provided on the tag. Further, the tag may be provided with comparison means to compare the ambient temperature with the animal temperature. An indicator may also be disposed on the tag, the indicator being responsive to the comparison means.

15 In a preferred embodiment, the sensor is provided on/in the attachment portion.

Desirably, the tag comprises a one piece moulded body.

Also contemplated by the present invention is the use of the temperature sensing device in the methods of the invention as described above.

20 This invention may also be said broadly to consist in the parts, elements and features referred to or indicated in the specification of the application, individually or collectively, and any or all combinations of any two or more of said parts, elements or features, and where specific integers are mentioned herein which have known equivalents in the art to 25 which this invention relates, such known equivalents are deemed to be incorporated herein as if individually set forth.

The invention consists in the foregoing and also envisages constructions of which the following give examples.

where initially:

$$n=1$$

$$d_0 = t_{ear} - t_{ambient}$$

$$fast_0 = d_0$$

$$5 \quad slow_0 = d_0$$

$$v_0 = 0$$

and where at each sampling interval:

$$d_n = t_{ear} - t_{ambient}$$

10

$$fast_n = (1 - c_1) * fast_{n-1} + c_1 * d_n$$

$$slow_n = (1 - c_2) * slow_{n-1} + c_2 * d_n$$

then:  $v_n = v_{n-1} + (fast_n - slow_n)$ .

15

35. The method as claimed in any one of claims 20 to 34 wherein the measurements are taken on the outer part of the animal's body.

20 36. The method as claimed in claim 35 wherein skin temperature measurements are taken and compensation is provided for ambient temperature and/or solar radiation.

37. The method as claimed in claim 35 wherein measurements are taken in the ear canal of the animal.

25

38. A method of measuring stress levels in an animal, the method comprising measuring the animal's pH level using a method of the invention, a pH level greater than 5.8 to 6.2 indicating a stressed animal.

54. The method as claimed in any one of claims 39 to 53 wherein the measurements are taken on the outer part of the animal's body.

5 55. The method as claimed in claim 54 wherein skin temperature measurements are taken and compensation is provided for ambient temperature and/or solar radiation.

56. The method as claimed in claim 54 wherein measurements are taken in the ear canal of the animal.

10 57. A system for providing an indication of meat quality in an animal to be slaughtered, the system including:

a measurement device for obtaining measurements corresponding to the body temperature of the animal at periodic sampling intervals;

15 a processor having an input means to receive the measurements from the measurement device, the processor operable to implement an algorithm to the measurements, which algorithm cumulatively takes account of variations in body temperature over time, wherein the processor has an output means for the result of the algorithm.

20 58. The system as claimed in claim 57 wherein the algorithm is as follows:  
determine the animal's mean body temperature from the measurements;  
calculate the variance between each measurement and the mean; and  
add all variances to obtain a cumulative variance score.

25 59. The system as claimed in claim 57 wherein the algorithm is as follows:

where:

$t_{ear}$  is the instantaneous ear temperature;

30  $t_{ambient}$  is the instantaneous ambient air temperature;

62. The system as claimed in claim 61 wherein the tag incorporates the measurement device.
- 5 63. The system as claimed in any one of claims 57 to 59, wherein the processor is provided by way of a remote computer.
64. The system as claimed in any one of claims 57 to 63 wherein the processor is adapted to output a numeric value from a comparison with a meat tenderness scale.
- 10 65. The system as claimed in any one of claims 57 to 63 wherein the processor is operable to compare the output of the algorithm to a predetermined threshold.
- 15 66. The system as claimed in claim 65 further including an indicator to indicate where the output of the algorithm has exceeded the predetermined threshold.
67. The system as claimed in claim 66 wherein the indicator is also operable to provide an indication that the system is functioning.
- 20 68. A system for indicating cumulative stress in an animal, the system including:  
a measurement device for obtaining measurements corresponding to outer body temperature of the animal at periodic time intervals;  
a processor having an input to receive measurements from the measurement device, the processor operable to implement an algorithm to the measurements,  
25 which algorithm cumulatively takes account of variations in body temperature over time, wherein the processor has an output for the result of the algorithm.
69. The system as claimed in claim 68 wherein the algorithm is as follows:  
determine the animal's average body temperature from the measurements;  
30 calculate the variance between each measurement and the average; and

then:  $v_n = v_{n-1} + (fast_n - slow_n)$ .

71. The system as claimed in any one of claims 68 to 70 wherein the system is embodied in an all-in-one indicator device.
- 5 72. The system as claimed in claim 71 wherein the device is provided in the form of an ear tag.
- 10 73. The system as claimed in claim 72 wherein the tag incorporates the measurement device.
74. The system as claimed in any one of claims 68 to 70 wherein the processor is provided by way of a remote computer.
- 15 75. The system as claimed in any one of claims 68 to 74 wherein the processor is adapted to output a numeric value or comparison with a meat tenderness scale.
76. The system as claimed in any one of claims 68 to 74 wherein the processor is operable to compare the output of the algorithm to a predetermined threshold.
- 20 77. The system as claimed in claim 76 further including an indicator to indicate where the output of the algorithm has exceeded the predetermined threshold.
78. The system as claimed in claim 77 wherein the indicator is operable to indicate that the system is functioning.
- 25 79. A system of indicating pH in an animal, the system including:  
a measurement device for obtaining measurements corresponding to outer body temperature of the animal at periodic time intervals;  
30 a processor having an input to receive measurements from the measurement

88. The system as claimed in claim 87 further including an indicator to indicate where the output of the algorithm has exceeded the predetermined threshold.

89. A computer program for providing an indication of meat quality in an animal to be slaughtered or for providing an indication of cumulative stress in an animal or for providing an indication of pH, the computer program including:

input means for receiving measurements corresponding to the body temperature of the animal at periodic time intervals;

an analysis engine programmed to implement an algorithm to the measurements, which algorithm cumulatively takes account of variations in body temperature over time and output means for the result of the algorithm.

90. The computer program as claimed in claim 89 wherein the analysis engine is programmed to compare the result of the algorithm to a predetermined threshold.

91. The computer program as claimed in claim 89 or claim 90 embodied in a microprocessor.

92. A temperature sensing device including:

a tag having an attachment portion for attachment of the tag to an animal, the tag incorporating an indicator means; and

one or more animal temperature sensors disposed on/in the tag for contact with the animal during use.

93. The tag as claimed in claim 92 wherein the tag is an ear tag.

94. The tag as claimed in claim 92 or claim 93 wherein, an ambient temperature sensor is also provided on the tag.

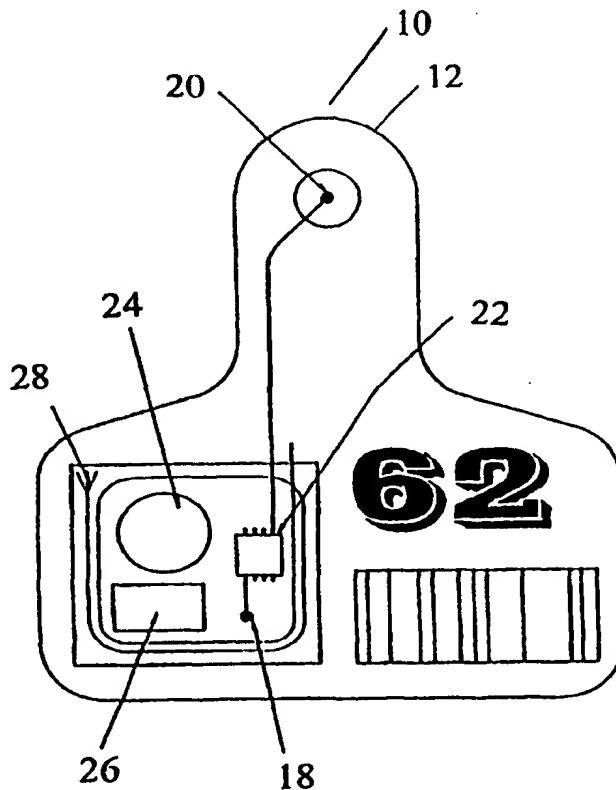
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(71) Applicant (for all designated States except US): THE HORTICULTURE AND FOOD RESEARCH INSTITUTE OF NEW ZEALAND LIMITED [NZ/NZ]; Corporate Office, Private Bag 11030, Palmerston North (NZ).			
(72) Inventor; and (75) Inventor/Applicant (for US only): COOK, Christian, John [NZ/NZ]; 70 Nevada Road, Hamilton (NZ).		Published With international search report.	
(74) Agents: CALHOUN, Douglas, C. et al.; A J Park & Son, 6th floor, Huddart Parker Building, Post Office Square, P.O. Box 949, Wellington 6015 (NZ).			

(54) Title: DETERMINING MEAT QUALITY OF A LIVE ANIMAL

## (57) Abstract

A method of providing an indication of pH levels in an animal can alternatively be used to provide an indication of stress in an animal. Since pH and temperature are related to ultimate meat quality, the method of the invention may also be used to provide an indication of ultimate meat quality. In the method, periodic measurements are obtained corresponding to the body temperature of the animal. An algorithm is applied to the measurements obtained. The algorithm cumulatively takes account of variations in body temperature over time. The results of the algorithm are compared to a pre-determined threshold. Alternatively, the results of the algorithm may be compared with a standard to provide a quantitative indication of pH, stress or meat tenderness. A system for providing an indication of meat quality/stress levels or pH levels in an animal is also provided. This system may be incorporated into an all-in-one device such as an ear tag (10). The tag (10) includes a measurement device (14) for obtaining measurements corresponding to the body temperature of the animal at periodic time intervals and a processor (22) to implement the algorithm. The processor includes an output means for the results of algorithm. The results may be further processed by the processor (22). For example, the results may be further processed by the processor (22) for comparison with a pre-determined threshold. If the threshold is exceeded then an indication of this fact can be achieved by a flashing LED (48) or any other visual or audible indicator means.



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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/NZ 99/00177

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2145224 A (DENNIS) 20 March 1985 Whole document	92-98
X	EP 166069 A (FRANTSITS) 2 January 1986 Whole document	92-98
X	DE 3610960 A (OBERSCHMID et al) 8 October 1987 Figures	92-98

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/NZ 99/00177

**Box 1** Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

**Box II** Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. Claims 1-91 directed to a method and apparatus for determining meat quality of an animal.
  2. Claims 92-98 directed to a temperature sensing device
- 
1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
  2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.  
**PCT/NZ 99/00177**

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
GB	2251683	AU	89884/91	JP	6090969	US	5285396
WO	95/01567	AU	72248/94	CN	1129983	EP	706654
		NZ	268868	US	5458418	US	5595444
END OF ANNEX							

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/NZ 99/00177

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>																						
Int Cl <sup>6</sup> : G01N 33/12, 25/00, G01K 13/00, 1/14, 1/20																						
According to International Patent Classification (IPC) or to both national classification and IPC																						
<b>B. FIELDS SEARCHED</b>																						
Minimum documentation searched (classification system followed by classification symbols) IPC: G01N, G01K, A01K																						
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched																						
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) DWPI: (HEAT OR TEMPERATURE) AND (STRESS+ OR PH OR TENDER+)																						
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>																						
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.																				
X	GB 2251683 A (AOYAMA) 15 July 1992 See whole document	20-33, 35-37, 57, 58, 60, 61, 63-69, 71, 74- 80, 82, 85-91																				
X	DE 4025404 A (FENDT et al) 13 February 1992 See whole document	20-33, 35-37, 57, 58, 60, 63-69, 71, 74-80, 82, 85-91																				
A	WO 95/01567 A (THE MINISTER OF AGRICULTURE) 12 January 1995 See whole document	1-91																				
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